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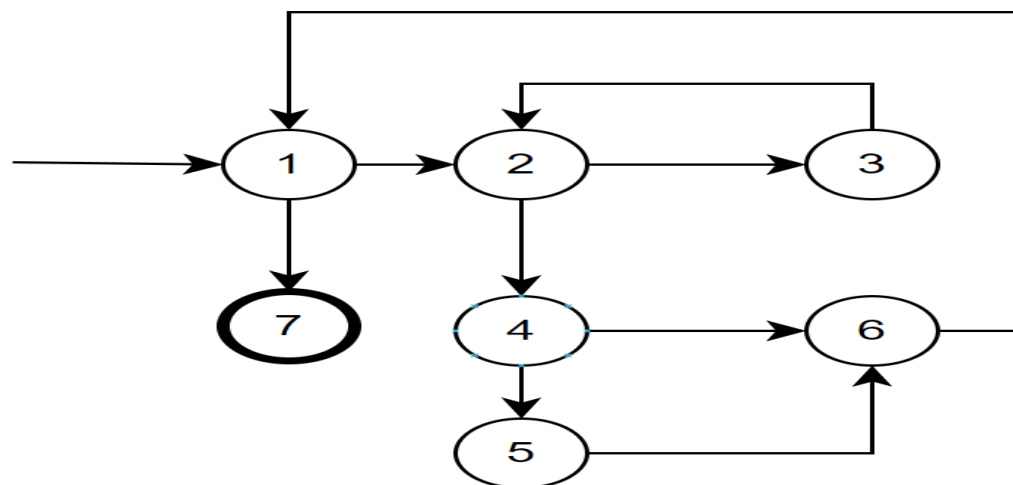**Class: IP**

5. Answer questions (e)–(g) for the graph defined by the following sets:
    - N = {1, 2, 3, 4, 5, 6, 7}
    - N_0 = {1}
    - N_f = {7}
    - E = {(1, 2),(1, 7),(2, 3),(2, 4),(3, 2),(4, 5),(4, 6),(5, 6),(6, 1)}

    Also consider the following (candidate) test paths:
    - t_0 = [1, 2, 4, 5, 6, 1, 7]
    - t_1 = [1, 2, 3, 2, 4, 6, 1, 7]

e. List the test requirements for node coverage, edge coverage, and prime path coverage on the graph.

    Answer:
    - Node coverage
        - Test requirement (TR) = {1, 2, 3, 4, 5, 6, 7}.
    - Edge coverage
        - Test requirement (TR) = {(1, 2), (1, 7), (2, 3), (2, 4), (3, 2), (4, 5), (4, 6), (5, 6), (6, 1)}.
    - Prime path coverage
        - Test requirement (TR) = {(1, 7), (3, 2, 3), (5, 6, 1, 7), (1, 2, 3, 2, 4, 5)}.

    f. List test paths that achieve node coverage but not edge coverage on the graph.

       Answer:

- Test path = (1, 2, 3, 2, 4, 5, 6, 1, 7) cover all nodes, but miss (4, 6) edge.

    g. List test paths that achieve edge coverage but not prime path coverage on the graph.

       Answer:

- Test path = (1, 2, 3, 2, 4, 6, 1, 7), (1, 2, 4, 5, 6, 1, 7) it covers all edges, but miss (3, 2, 3, 2) prime path

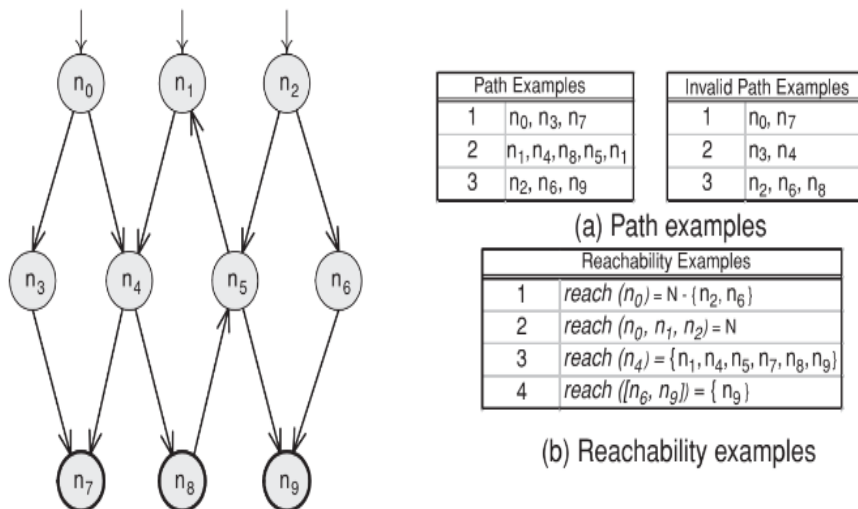6. Answer questions (a)–(c) for the graph in Figure 2.2.

Path Examples	
1	n_0, n_3, n_7
2	n_1, n_4, n_8, n_5, n_1
3	n_2, n_6, n_9

Invalid Path Examples	
1	n_0, n_7
2	n_3, n_4
3	n_2, n_6, n_8

(a) Path examples

Reachability Examples	
1	$reach\,(n_0) = N - \{n_2, n_6\}$
2	$reach\,(n_0, n_1, n_2) = N$
3	$reach\,(n_4) = \{n_1, n_4, n_5, n_7, n_8, n_9\}$
4	$reach\,([n_6, n_9]) = \{n_9\}$

(b) Reachability examples

Figure 2.2. Example of paths.

    a. Enumerate the test requirements for node coverage, edge coverage, and prime path coverage on the graph.

       Answer:

- Node coverage
  - Test requirement (TR) = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}.
- Edge coverage
  - Test requirement (TR) = {(0, 3), (0, 4), (1, 4), (2, 5), (2, 6), (3, 7), (4, 7), (4, 8), (5, 1), (5, 9), (6, 9), (8, 5)}.
- Prime path coverage
  - Test requirement (TR) = {(0,3,7), (0,4,7), (1,4,7), (2, 5, 9), (2, 6, 9), (0, 4, 8, 5, 9), (0,4,8,5)}.

    b. List test paths that achieve node coverage but not edge coverage on the graph.

Answer:

Test path = (0, 3, 7), (1, 4, 8, 5, 9), (2, 6, 9) cover all nodes, but miss (0, 4), (2, 5), (4, 7), (5, 1) edges

  c. List test paths that achieve edge coverage but not prime path coverage on the graph.

Answer:

Test path = (0, 3, 7), (1, 4, 8, 5, 1, 4, 8, 5, 9), (0, 4, 7), (2, 5, 9), (2, 6, 9) cover all edges, but miss (1,4,7), (0, 4, 8, 5, 9), (0,4,8,5) prime path.

7. Answer questions (c)–(d) for the graph defined by the following sets:
   - N = {0, 1, 2}
   - N_0 = {0}
   - N_f = {2}
   - E = {(0, 1),(0, 2),(1, 0),(1, 2),(2, 0)}

Also consider the following (candidate) paths:
   - ~~p_0 = [0, 1, 2, 0]~~
   - **p_1 = [0, 2, 0, 1, 2]**
   - **p_2 = [0, 1, 2, 0, 1, 0, 2]**
   - ~~p_3 = [1, 2, 0, 2]~~
   - ~~p_4 = [0, 1, 2, 1, 2]~~

  c. Does the set of test paths (part a) above satisfy edge-pair coverage? If not, identify what is missing.

Answer:

No, it missing (1, 0, 1) and (2, 0, 2) edge-pairs

  d. Consider the prime path [n_2, n_0, n_2] and path p_2. Does p_2 tour the prime path directly? With a sidetrip?

Answer:

No, the tour for the prime path is sidetrip because there is a additional nodes in between